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U.S. Department of the Interior • U.S. Geological Survey

**MINERAL INDUSTRY SURVEYS**

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**NICKEL IN JUNE 1997**

Reported domestic nickel consumption in June, on a daily average basis, was 4% greater than that of May, according to the U.S. Geological Survey. Daily usage by the stainless steel industry was almost identical to the May average of 122 metric tons (t). Sales to plating companies averaged 52 t per day, almost 19% more than in May. However, consumption of elemental nickel to make nickel-base corrosion resistant alloys decreased 10%. Percentages reported in this paragraph may not be verifiable owing to the concealment of company proprietary data. Trade data for June will appear in a subsequent issue.

**Two electric vehicles powered by nickel-metal hydride batteries debut in the 1998 model year**

In May, Honda Motor Co. Limited began offering its *EV Plus* to fleet owners in California. The four-passenger car is the first mass-marketed electric vehicle (EV) in the United States to use advanced nickel-metal hydride (Ni-MH) batteries. The car is powered by 24 sealed Ni-MH battery modules connected in series. Each battery module has an nominal open-circuit potential of 12 volts. This configuration provides a total voltage of 288 volts to a DC brushless motor. The high-efficiency motor utilizes high strength permanent magnets made from rare earths and has an output of 49 kilowatts. The body is designed exclusively as an electric car (Gale, 1996).

The *EV Plus* has a maximum speed of 130 kilometers per hour (about 80 miles per hour) and an approximate range of 210 kilometers (130 miles) in normal traffic. The official EPA City and Highway ranges are 100 miles and 84 miles, respectively, based on an 80% depth of discharge. Honda expects to market about 300 of the vehicles over the next year or two (Electric Vehicle Association of the Americas, 1997a).

In mid-October, Toyota Motor Sales USA, Inc. began offering its *RAV4-EV* sports utility vehicle to U.S. fleet operators. Like the *EV Plus*, the Toyota vehicle has 24 sealed

Ni-MH battery modules connected in series, providing 288 volts to an electric motor (Electric Vehicle Association of the Americas, 1997b). The five-passenger *RAV4-EV* can travel about 210 kilometers on a single recharge—the same range as the *EV Plus*. The *RAV4-EV* can be recharged in about 8 hours using a 220-volt electric line—the same type of line already built into many U.S. homes to operate electric clothes dryers.

Toyota also is preparing to market a hybrid vehicle. This vehicle combines a small gasoline engine with an electric motor-generator. In low-speed, stop-and-go city driving only the electric motor powers the car. When higher speeds are possible, generally outside the city, the gasoline engine cuts in to supply extra power and to recharge the batteries. Toyota is planning to sell the hybrid vehicle first in Japan and expects to initially produce about 1,000 hybrids per year. The hybrid will cost about \$4,300 more than Toyota's standard car, but prices are expected to come down as production increases. The hybrid system is expected to have twice the efficiency of a conventional gasoline engine, while significantly reducing exhaust emissions (The Times @ Toyota, 1997).

**References Cited**

- Electric Vehicle Association of the Americas, 1997a, Electric Vehicles—Honda *EV Plus*: Electric Vehicle Association of the Americas, vehicle specifications, 2 p. (Accessed October 22, 1997, on the World Wide Web at URL <http://www.evaa.org/vehicles/honda.html>).
- Electric Vehicle Association of the Americas, 1997b, Electric Vehicles—Toyota *RAV4-EV*: Electric Vehicle Association of the Americas, vehicle specifications, 2 p. (Accessed October 22, 1997, on the World Wide Web at URL <http://www.evaa.org/vehicles/toyota.html>).
- Gale, Lindsay, ed., 1996, Japan *EVS 13* round-up, in *Electric and Hybrid Vehicle Technology '96*: Dorking, United Kingdom, UK & International Press, p. 26-33.
- The Times @ Toyota, 1997, Toyota reveals futuristic cars: Toyota Motor Sales USA Inc., 1 p. (Accessed October 23, 1997, on the World Wide Web at URL <http://www.toyota.com/times/>).

TABLE 1  
CONSUMPTION OF NICKEL (EXCLUSIVE OF SCRAP), BY FORM AND USE 1/

(Metric tons, nickel content)

Period	Cathodes, pellets, briquets, and powder	Ferronickel	Oxide-sinter, salts, and other forms	Total	Total year to date
1996:					
June	6,710	1,530	236	8,480	51,400
July	6,520	1,160	131	7,810	59,300
August	6,340	1,450	140	7,930	67,200
September	6,050	1,540	178	7,770	75,000
October	6,740	1,750	320	8,810	83,800
November	5,700	1,340	365	7,400	91,200
December	5,690	1,650	181	7,520	98,700
January-December	78,100	17,600	2,980	98,700	XX
1997:					
January	6,900	2,000	101	9,000	9,000
February	5,950	1,510	129	7,590	16,600
March	5,730	1,580	253	7,560	24,200
April	6,480	1,490	570	8,540	32,700
May	6,600	1,300	410	8,310	41,000
June:					
Steel:					
Stainless and heat resisting	2,230	1,140	W	3,370	22,100
Alloy (excludes stainless)	286	W	W	286	3,310
Superalloys	808	--	W	808	4,550
Copper-nickel alloys	W	W	--	W	W
Electrical, magnetic, and expansion alloys	W	--	--	W	W
Other nickel & nickel alloys	W	W	W	W	W
Cast iron	W	--	--	W	W
Electroplating (sales to platers)	1,560	--	W	1,560	7,810
Chemical and chemical uses	W	--	W	W	W
Other uses	1,750	138	434	2,320	11,600
Total reported	6,630	2/ 1,280	434	8,350	49,300
Total all companies (calc) 3/	XX	XX	XX	12,200	71,800
1997: January-June	38,300	9,160	1,900	49,300	XX
1996: January-June	41,100	8,700	1,660	51,400	XX

W Withheld to avoid disclosing company proprietary data; included in "Other uses" category. XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Of consumption, 5,760 metric tons were consumed as cathodes and pellets, the remainder as briquets and powder.

3/ Figures represent calculated apparent consumption; based on the revised proportion of reported primary consumption (68.69%) to apparent primary consumption for 1994.

TABLE 2  
ENDING STOCKS OF NICKEL (EXCLUSIVE OF SCRAP) HELD BY CONSUMERS,  
BY FORM AND USE 1/ 2/

(Metric tons, nickel content)

Period	Cathodes, pellets, briquets, and powder	Ferronickel	Oxide-sinter, salts, and other forms	Total
1996:				
June	3,610	337	91	4,040
July	3,450	517	70	4,040
August	3,340	429	77	3,850
September	2,910	277	82	3,270
October	2,770	472	82	3,320
November	6,170	625	64	6,860
December	4,990	1,540	78	6,610
1997:				
January	4,370	659	55	5,080
February	3,970	231	180	4,390
March	4,020	240	603	4,870
April	3,780	366	633	4,770
May	3,240	344 r/	581 r/	4,170
June:				
Steel (stainless, heat resisting and alloy)	1,710	388	(3/)	2,100
Nonferrous alloys 4/	1,990	(5/)	(3/)	1,990
Foundry (cast irons)	(6/)	--	(3/)	(3/)
Chemical (catalysts, ceramics, plating salts, etc.) and unspecified uses	177	--	302	479
Total	3,880	388	302	4,570

r/ Revised.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Stocks held by companies that consume nickel in more than one end use category are credited to the major category. Stocks are subject to revisions owing to inventory adjustment.

3/ Included in "Chemicals and unspecified uses" category.

4/ Includes superalloys, nickel-copper and copper-nickel alloys, permanent magnet alloys, and other nickel alloys.

5/ Included in "Chemicals and unspecified uses" category of "Oxide-sinter, salts, and other forms."

6/ Included in "Chemicals and unspecified uses" category of "Cathodes, pellets, briquets, and powder."

TABLE 3  
CONSUMPTION AND ENDING STOCKS OF PURCHASED SECONDARY NICKEL, BY USE 1/

(Metric tons, nickel content)

Period	Consumption			Stocks		
	Ferrous scrap 2/	Nonferrous scrap 3/	Total scrap	Ferrous scrap 2/	Nonferrous scrap 3/	Total scrap
1996:						
June	3,780	635	4,410	3,070	101	3,170
July	3,670	690	4,360	3,320	97	3,420
August	2,860	1,080	3,940	3,360	98	3,460
September	3,490	871	4,370	3,100	110	3,210
October	3,600	773	4,370	3,340	107	3,450
November	3,250	785	4,030	3,630	89	3,720
December	3,320	656	3,970	3,510	88	3,600
January-December	43,400	9,980	53,400	XX	XX	XX
1997:						
January	4,800	830	5,630	3,160	116	3,280
February	3,880	791	4,670	3,290	114	3,400
March	4,250	995	5,250	4,090	104	4,190
April	5,260	774	6,040	3,820	113	3,940
May	4,750	826	5,570	3,790	114	3,900
June	4,770	740	5,510	3,900	112	4,020
1997: January-June	27,700	4,960	32,700	XX	XX	XX
1996: January-June	23,200	5,130	28,300	XX	XX	XX

XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Nickel content is calculated from an average nickel content and the reported gross weight of scrap.

3/ Combined consumption and stocks of aluminum-base, copper-base, and nickel-base scrap.

TABLE 4  
U.S. IMPORTS FOR CONSUMPTION OF NICKEL, BY COUNTRY 1/

(Metric tons, nickel content 2/)

Period and country of origin	Cathodes, pellets, and briquets	Powder and flakes	Ferro- nickel	Metal- lurgical- grade oxide	Waste and scrap	Stainless steel scrap	Chemicals	Total 3/	Total year to date 4/	Wrought nickel
1996:										
May	11,000	945	2,020	91	411	319	219	15,000	69,400	72
June	7,750	927	1,430	9	343	289	254	11,000	80,400	43
July	7,230	684	1,470	18	238	274	216	10,100	90,500	42
August	9,250	835	1,120	14	235	319	265	12,000	103,000	44
September	9,390	629	884	33	416	322	234	11,900	114,000	52
October	7,850	779	1,050	60	581	373	311	11,000	125,000	67
November	9,820	670	1,520	99	328	308	290	13,000	138,000	38
December	9,180	815	969	21	351	275	251	11,900	150,000	61
January-December	113,000	9,690	16,000	463	4,270	3,790	3,270	150,000	XX	636
1997:										
January	7,640	954	1,180	111	364	263	265	10,800	10,800	57
February	9,310	945	1,180	395	696	392	242	13,200	23,900	53
March	14,500	1,130	1,070	277	544	342	198	18,100	42,000	73
April	7,920	948	1,050	347	572	433	294	11,600	53,600	78
May:										
Australia	1,240	100	--	--	--	--	--	1,340	5,280	--
Canada	5,290	576	--	217	96	287	45	6,510	30,500	5
Colombia	--	--	113	--	--	--	--	113	605	--
Dominican Republic	--	--	911	--	10	--	--	921	3,660	--
Finland	558	78	--	--	--	--	49	686	2,320	--
France	140	--	--	--	29	--	15	185	1,150	27
Germany	--	4	--	--	38	7	31	80	377	38
Japan	--	32	--	--	3	9	46	90	409	7
New Caledonia	--	--	278	--	--	--	--	278	1,510	--
Norway	4,780	--	--	--	6	--	--	4,790	12,000	--
Russia	1,450	--	--	--	--	--	--	1,450	9,600	--
South Africa	40	--	--	--	--	--	--	40	201	--
United Kingdom	18	21	--	--	135	--	21	195	767	(5/)
Zimbabwe	174	--	--	--	--	--	--	174	480	--
Other	200	27	113	--	52	166	90	648	2,270	22
Total	13,900	839	1,420	217	370	469	297	17,500	71,100	99
1997: January-May	53,300	4,820	5,890	1,350	2,550	1,900	1,300	71,100	XX	360
1996: January-May	52,400	4,360	7,550	210	1,780	1,630	1,440	69,400	XX	290

XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ The nickel contents are assumed to be as follows: metallurgical-grade oxide (77%), waste and scrap (50%), and stainless steel scrap (7.5%). The chemical category includes chlorides (25%), sulfates (22%), and other salts (22%), supported catalysts (22%), and oxide, sesquioxide and hydroxide (65%).

3/ Excludes wrought nickel.

4/ May include revisions for prior months.

5/ Less than 1/2 unit.

Source: Bureau of the Census.

TABLE 5  
U.S. EXPORTS OF NICKEL, BY COUNTRY 1/

(Metric tons, nickel content 2/)

Period and country of destination	Cathodes, pellets, and briquets	Powder and flakes	Ferro- nickel	Metal- lurgical- grade oxide	Waste and scrap	Stainless steel scrap	Chemicals	Total 3/	Total year to date 4/	Wrought nickel
1996:										
May	82	171	220	331	782	1,520	519	3,620	17,200	31
June	79	142	73	616	800	1,530	295	3,530	20,700	19
July	7	50	650	480	778	2,650	364	4,980	25,700	30
August	44	97	299	348	703	2,200	424	4,120	29,800	64
September	6	80	179	359	1,210	2,230	292	4,360	34,200	27
October	20	79	359	420	1,280	2,270	185	4,620	38,800	63
November	19	88	324	517	918	1,610	197	3,670	42,500	59
December	21	75	433	393	960	1,850	551	4,280	46,800	21
January-December	586	1,060	3,330	4,210	10,900	22,800	3,940	46,800	XX	439
1997:										
January	20	72	442	513	862	1,740	455	4,100	4,100	56
February	39	114	416	134	1,000	1,690	515	3,920	8,020	89
March	26	93	616	172	1,210	1,280	488	3,880	11,900	61
April	33	84	725	148	1,480	2,740	684	5,890	17,800	158
May:										
Australia	--	--	--	--	--	--	(5/)	(5/)	66	--
Belgium	--	31	--	--	--	--	17	48	181	1
Canada	1	48	--	39	638	278	60	1,060	5,860	3
Germany	(5/)	1	--	--	105	1	1	108	385	(5/)
India	--	1	273	--	--	5	--	279	865	--
Italy	--	--	--	--	--	2	--	2	87	--
Japan	--	4	60	--	215	81	230	590	2,250	1
Korea, Republic of	--	6	--	--	--	367	4	376	3,410	24
Mexico	2	7	5	(5/)	2	11	16	44	448	3
Netherlands	--	(5/)	--	--	--	60	--	60	139	--
Spain	--	(5/)	--	--	--	348	--	348	1,820	--
Sweden	--	1	--	--	306	26	--	333	1,260	(5/)
Taiwan	--	1	420	--	--	260	22	703	2,740	--
United Kingdom	23	(5/)	35	9	--	32	8	107	311	10
Other	3	2	120	76	26	143	81	451	2,480	16
Total	29	102	913	124	1,290	1,610	439	4,510	22,300	58
1997: January-May	145	466	3,110	1,090	5,850	9,060	2,580	22,300	XX	422
1996: January-May	389	448	1,010	1,080	4,220	8,410	1,630	17,200	XX	156

XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ The nickel contents are assumed to be as follows: metallurgical-grade oxide (77%), waste and scrap (50%), and stainless steel scrap (7.5%). The chemical category includes chlorides (25%), sulfates (22%), and other salts (22%), supported catalysts (22%), and oxide, sesquioxide and hydroxide (65%).

3/ Excludes wrought nickel.

4/ May include revisions for prior months.

5/ Less than 1/2 unit.

Source: Bureau of the Census.

TABLE 6  
U.S. IMPORTS FOR CONSUMPTION OF NICKEL ALLOYS, BY COUNTRY 1/

(Metric tons, gross weight )

Period and country of origin	Unwrought alloyed ingot	Bars, rods, and profiles	Wire	Plates and sheets	Foil	Tubes and pipes	Other alloyed articles	Total	Total year to date 2/
1996:									
May	178	249	175	170	(3/)	67	18	858	4,370
June	221	242	116	157	(3/)	71	54	861	5,220
July	188	117	195	90	(3/)	44	107	743	5,960
August	91	219	97	187	(3/)	49	615	1,260	7,220
September	117	70	144	133	(3/)	50	59	573	7,800
October	249	151	120	90	(3/)	72	60	741	8,540
November	349	161	168	81	(3/)	66	29	845	9,390
December	151	178	256	145	(3/)	48	64	843	10,200
January-December	2,780	2,110	1,810	1,520	2	832	1,190	10,200	XX
1997:									
January	208	132	196	98	--	100	108	841	841
February	181	202	190	149	--	96	107	926	1,770
March	265	184	266	90	(3/)	117	52	974	2,740
April	234	186	283	139	--	298	61	1,200	3,940
May:									
Australia	262	--	--	--	--	--	--	262	790
Belgium	24	--	--	(3/)	--	--	--	24	81
Canada	29	(3/)	2	(3/)	--	5	2	38	170
France	--	6	42	18	--	(3/)	1	67	408
Germany	3	73	92	158	--	12	1	339	1,220
Italy	--	27	--	--	--	13	15	55	335
Japan	8	--	4	1	(3/)	45	2	60	400
Mexico	(3/)	--	--	--	--	--	1	1	2
Netherlands	--	--	(3/)	--	--	10	6	16	51
South Africa	40	--	--	--	--	--	--	40	178
Sweden	--	--	144	10	--	5	--	159	712
United Kingdom	31	37	2	2	(3/)	14	4	90	538
Other	60	5	4	1	--	--	24	94	304
Total	457	148	290	190	1	104	56	1,250	5,190
1997: January-May	1,340	852	1,230	667	1	715	384	5,190	XX
1996: January-May	1,420	970	712	633	1	432	199	4,370	XX

XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ May include revisions for prior months.

3/ Less than 1/2 unit.

Source: Bureau of the Census.

TABLE 7  
U.S. EXPORTS OF NICKEL ALLOYS, BY COUNTRY 1/

(Metric tons, gross weight )

Period and country of destination	Unwrought alloyed ingot	Bars, rods, and profiles	Wire	Plates and sheets	Foil	Tubes and pipes	Other alloyed articles	Total 2/	Total year to date 2/
1996:									
May	508	219	149	792	7	89	242	2,010	10,100
June	531	270	155	676	60	81	168	1,940	12,100
July	335	349	148	628	8	84	451	2,000	14,100
August	540	184	176	619	5	96	183	1,800	15,900
September	274	177	166	622	9	78	176	1,500	17,400
October	602	240	147	600	12	49	394	2,040	19,400
November	485	340	113	725	5	74	276	2,020	21,400
December	478	191	119	971	9	146	129	2,050	23,500
January-December	5,710	3,210	1,560	8,000	200	1,270	3,520	23,500	XX
1997:									
January	541	320	115	838	10	91	120	2,030	2,030
February	641	222	137	554	20	136	180	1,890	3,930
March	425	334	152	845	23	99	597	2,480	6,400
April	344	225	224	649	14	90	374	1,920	8,320
May:									
Australia	(3/)	(3/)	1	59	--	(3/)	--	60	327
Belgium	--	2	--	4	--	(3/)	--	6	65
Canada	84	29	18	45	5	20	36	237	1,630
France	85	32	2	4	(3/)	(3/)	14	137	1,110
Germany	4	14	1	39	(3/)	(3/)	5	63	350
India	--	(3/)	--	(3/)	--	(3/)	(3/)	(3/)	4
Ireland	--	(3/)	52	2	--	(3/)	1	55	149
Italy	(3/)	3	12	125	--	4	(3/)	144	588
Japan	25	11	26	94	--	18	8	182	1,000
Korea, Republic of	2	1	5	65	(3/)	6	8	87	555
Mexico	33	3	25	16	--	5	6	88	263
Netherlands	3	26	11	10	--	(3/)	(3/)	50	191
Singapore	--	1	1	4	--	(3/)	1	7	95
Spain	--	(3/)	--	--	--	1	--	1	65
Sweden	--	1	--	6	10	(3/)	(3/)	17	96
Switzerland	(3/)	(3/)	--	11	--	(3/)	5	16	78
Taiwan	4	(3/)	2	1	--	--	17	24	200
United Kingdom	7	133	35	299	(3/)	7	2	483	2,050
Other	15	34	21	26	--	20	43	159	1,330
Total	262	290	212	810	15	81	146	1,820	10,100
1997: January-May	2,210	1,390	841	3,700	82	497	1,420	10,100	XX
1996: January-May	2,470	1,460	537	3,160	91	661	1,740	10,100	XX

XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ May include revisions for prior months.

3/ Less than 1/2 unit.

Source: Bureau of the Census.

TABLE 8  
NICKEL CONSUMPTION IN CAST AND WROUGHT PRODUCTS

	Percent	
	Wrought	Cast
June 1997:		
Stainless and heat resisting steels	97	3
Alloy steels	100	(1/)
Superalloys	71	29
Copper-nickel alloys	96	4
Other nickel-base alloys	100	(1/)

1/ Less than 1/2 unit.

TABLE 9  
NICKEL PRICES

Date	Cathode NY Dealer \$/lb.	LME Cash \$/t	LME Cash \$/lb.	18/8 Stainless steel scrap Pittsburgh \$/long ton(gw)
1997:				
Average for the month of:				
June	3.319	7,062.476	3.203	845
July	3.175	6,835.500	3.101	809
For week ending:				
June 6	3.27-3.37	7,021.200	3.185	840-850
June 13	3.39-3.42	7,171.400	3.253	840-850
June 20	3.33-3.39	7,093.300	3.217	840-850
June 27	3.29-3.35	7,019.000	3.184	840-850
July 4	3.22-3.29	6,808.700	3.088	800-810
July 11	3.19-3.23	6,760.800	3.067	800-820
July 18	3.15-3.22	6,716.500	3.047	800-820
July 25	3.16-3.18	6,698.000	3.038	800-820
August 1	3.17-3.49	7,285.800	3.305	800-820
August 8	3.31-3.43	7,115.500	3.228	790-800
August 15	3.11-3.32	6,654.900	3.019	790-800
August 22	3.09-3.13	6,591.300	2.990	790-800

Sources: Platt's Metals Week and American Metal Market.